

**AMENDMENTS TO THE CLAIMS**

**Please cancel claims 9-13 without prejudice or disclaimer, add claims 22-27, amend claims 1, 4, 8, 14, 16, and 19-21 as follows:**

1. (Currently Amended) A method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal, comprising:

adding a predetermined dopant to the  $\text{Ga}_2\text{O}_3$  system single crystal such that said dopant is substituted for Ga in the  $\text{Ga}_2\text{O}_3$  system single crystal to obtain a desired conductivity,

wherein said predetermined dopant comprises one of:

an n-type dopant for controlling said conductivity of the  $\text{Ga}_2\text{O}_3$  system single crystal comprising one of Si, Hf, Ge, Sn, and Ti, said conductivity of the  $\text{Ga}_2\text{O}_3$  system single crystal being controlled depending on an adding amount of said n-type dopant; and

a p-type dopant for controlling said conductivity of the  $\text{Ga}_2\text{O}_3$  system single crystal comprising one of H, Li, Na, K, Rb, Cs, Fr, Be, Ca, Sr, Ba, Ra, Mn, Fe, Co, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, Tl, and Pb, said conductivity of the  $\text{Ga}_2\text{O}_3$  system single crystal being controlled depending on an adding amount of said p-type dopant, and

wherein a purity of said  $\text{Ga}_2\text{O}_3$  system single crystal is 6N.

2. – 3. (Canceled).

4. (Currently Amended) The method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal according to claim 1, wherein a value of  $2.0 \times 10^{-3}$  to  $8.0 \times 10^2 \Omega\text{cm}$  is obtained as ~~the~~ a desired resistivity by adding a predetermined amount of said n-type dopant.

5. (Previously Presented) The method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal according to claim 4, wherein a carrier concentration of the  $\text{Ga}_2\text{O}_3$  system single crystal is controlled to fall within a range of  $5.5 \times 10^{15}$  to  $2.0 \times 10^{19}/\text{cm}^3$  as a range of the desired resistivity.

6. – 7. (Cancelled).

8. (Currently Amended) The method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal according to claim 1, wherein  $1 \times 10^3 \Omega\text{cm}$  or more is obtained as ~~the~~ a desired resistivity by adding a predetermined amount of said p-type dopant.

9. – 13. (Canceled).

14. (Withdrawn – Currently Amended) A light emitting element, comprising:  
an n-type  $\beta\text{-AlGaO}_3$  cladding layer, an active layer, a p-type  $\beta\text{-AlGaO}_3$  cladding layer, and a p-type  $\beta\text{-Ga}_2\text{O}_3$  contact layer respectively laminated in order on an n-type  $\beta\text{-Ga}_2\text{O}_3$  contact layer, said n-type  $\beta\text{-Ga}_2\text{O}_3$  contact layer made of a  $\beta\text{-Ga}_2\text{O}_3$  single crystal;  
a transparent electrode and a pad electrode respectively formed in order on said p-type  $\beta\text{-Ga}_2\text{O}_3$  contact layer; and  
an n-side electrode formed over a lower surface of said n-type  $\beta\text{-Ga}_2\text{O}_3$  contact layer,  
wherein a desired resistivity of said  $\beta\text{-Ga}_2\text{O}_3$  single crystal is obtained,  
wherein a purity of said  $\beta\text{-Ga}_2\text{O}_3$  single crystal is 6N,  
wherein said n-type layers comprise a dopant including one of Si, Hf, Ge, Sn, and Ti, and  
wherein said p-type layers comprise a dopant including one of H, Li, Na, K, Rb, Cs, Fr, Be, Ca, Sr, Ba, Ra, Mn, Fe, Co, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, Tl, and Rb.

15. (Withdrawn) The light emitting element of claim 14, wherein a carrier concentration of said p-type  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> contact layer is greater than that of said p-type  $\beta$ -AlGaO<sub>3</sub> cladding layer; and  
wherein a carrier concentration of said n-type  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> contact layer is greater than that of said n-type  $\beta$ -AlGaO<sub>3</sub> cladding layer.

16. (Currently Amended) A method of controlling a conductivity of a Ga<sub>2</sub>O<sub>3</sub> system single crystal, comprising:

adding a predetermined dopant to the Ga<sub>2</sub>O<sub>3</sub> system single crystal such that said dopant is substituted for Ga in the Ga<sub>2</sub>O<sub>3</sub> system single crystal to obtain a desired conductivity,

wherein said predetermined dopant comprises a p-type dopant for controlling said conductivity of the Ga<sub>2</sub>O<sub>3</sub> system single crystal, said p-type dopant comprising one of H, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Mn, Fe, Co, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, Tl, and Pb, said conductivity of the Ga<sub>2</sub>O<sub>3</sub> system single crystal being controlled depending on an adding amount of said p-type dopant, and

wherein a purity of said Ga<sub>2</sub>O<sub>3</sub> system single crystal is 6N.

17. (Previously Presented) The method of controlling said conductivity of said Ga<sub>2</sub>O<sub>3</sub> system single crystal according to claim 16, wherein the predetermined dopant comprises one of:

said p-type dopant; and

an n-type dopant for controlling said conductivity of the Ga<sub>2</sub>O<sub>3</sub> system single crystal.

18. (Previously Presented) The method of controlling a conductivity of a Ga<sub>2</sub>O<sub>3</sub> system single crystal according to claim 17, wherein said n-type dopant comprises one of Si, Hf, Ge, Sn, Ti, and Zr.

19. (Currently Amended) The method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal according to claim 17, wherein a value of  $2.0 \times 10^{-3}$  to  $8.0 \times 10^2 \Omega\text{cm}$  is obtained as ~~the~~ a desired resistivity by adding a predetermined amount of said n-type dopant.

20. (Currently Amended) The method of forming a  $\text{Ga}_2\text{O}_3$  system single crystal layer according to claim 19, wherein a carrier concentration of the  $\text{Ga}_2\text{O}_3$  system single crystal is controlled to fall within a range of  $5.5 \times 10^{15}$  to  $2.0 \times 10^{19}/\text{cm}^3$  as a range of said desired resistivity.

21. (Currently Amended) The method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal according to claim 16, wherein  $1 \times 10^3 \Omega\text{cm}$  or more is obtained as ~~the~~ a desired resistivity by adding a predetermined amount of said p-type dopant.

22. (New) A method of controlling a conductivity of a  $\text{Ga}_2\text{O}_3$  system single crystal, comprising:  
adding a predetermined dopant to the  $\text{Ga}_2\text{O}_3$  system single crystal such that said predetermined dopant is substituted for Ga in the  $\text{Ga}_2\text{O}_3$  system single crystal to obtain a desired conductivity,

wherein said predetermined dopant comprises a p-type dopant for controlling said conductivity of the  $\text{Ga}_2\text{O}_3$  system single crystal, said p-type dopant comprising one of H, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Mn, Fe, Co, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, Tl, and Pb, said conductivity of the  $\text{Ga}_2\text{O}_3$  system single crystal being controlled depending on an adding amount of said p-type dopant,

wherein said desired conductivity is dependent upon an amount of said predetermined dopant added to said  $\text{Ga}_2\text{O}_3$  system single crystal.

23. (New) The method of controlling said conductivity of said Ga<sub>2</sub>O<sub>3</sub> system single crystal according to claim 22, wherein the predetermined dopant comprises one of:

said p-type dopant; and

an n-type dopant for controlling said conductivity of the Ga<sub>2</sub>O<sub>3</sub> system single crystal.

24. (New) The method of controlling a conductivity of a Ga<sub>2</sub>O<sub>3</sub> system single crystal according to claim 23, wherein said n-type dopant comprises one of Si, Hf, Ge, Sn, Ti, and Zr.

25. (Currently Amended) The method of controlling a conductivity of a Ga<sub>2</sub>O<sub>3</sub> system single crystal according to claim 23, wherein a value of  $2.0 \times 10^{-3}$  to  $8.0 \times 10^2 \Omega\text{cm}$  is obtained as a desired resistivity by adding a predetermined amount of said n-type dopant.

26. (New) The method of forming a Ga<sub>2</sub>O<sub>3</sub> system single crystal layer according to claim 25, wherein a carrier concentration of the Ga<sub>2</sub>O<sub>3</sub> system single crystal is controlled to fall within a range of  $5.5 \times 10^{15}$  to  $2.0 \times 10^{19}/\text{cm}^3$  as a range of said desired resistivity.

27. (New) The method of controlling a conductivity of a Ga<sub>2</sub>O<sub>3</sub> system single crystal according to claim 22, wherein  $1 \times 10^3 \Omega\text{cm}$  or more is obtained as a desired resistivity by adding a predetermined amount of said p-type dopant.